A Work Project, presented as part of the requirements for the Award of a Master's degree in Finance from the Nova School of Business and Economics.

The Impact of Covid-19 on Transfer Expenditures in European Football

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04 - 01 - 2021

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Abstract

This work project suggests that the Covid-19 pandemic led to an increased uncertainty in the revenues of football clubs and thereby in the underlying value of football players. As a consequence, clubs prefer the option to wait and delay their investments in form of transfers rather than investing immediately. This phenomenon was observed to be more extreme for players carrying expensive characteristics. Meaning a higher change in the volatility of these players' value is likely.

Keywords: Football, Transfer Expenditures, Covid-19, Option to Defer

This work used infrastructure and resources funded by Fundacao para a Ciencia e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

1 Introduction

The evolution of transfer expenditures in the football industry has experienced an unprecedented rise over the past decade. Considering the total volume spent on new signings in the summer transfer window by all teams playing in the five top-flights of European football[1], one can witness an increase of roughly 80% between 2009 and 2019 (Table 9). Such evolution has established transfer fees among player salaries as the major expense for professional football clubs (Ross et al. 2019).

With the outbreak of the Covid-19 pandemic, the industry has encountered unknown levels of uncertainty. Several leagues set an end to their 2019/20 campaigns after the outbreak, while others resumed in the summer, however without audience (Homewood et al. 2020). Consequently, clubs have faced dramatic losses on matchday and, depending on the scenario, on broadcasting and commercial revenues. Despite the delayed launch of all 2020/21 campaigns, broadcasting and commercial partners' economic weakness and the unknown return of unlimited crowds to the stadiums have not led to a reduction in uncertainty (Ajadi et al. 2020).

With a drop of 42.74% in the total volume spent on new signings coming into and out of the top five leagues in the most recent transfer window (Table 10), such financial uncertainty has set an abrupt end to the previous rise. What remains is the question regarding a possible pattern in the reduction.

On the one hand, sharing McKinsey's (Charumilind et al. 2020) perception of an epidemiological endpoint by the second half of 2021, the impact of Covid-19 on the financials of football clubs would arguably be diminishing over time. Therefore, one could expect the prices of players, who have less time in their career beyond this financially uncertain period, to have suffered the most. On the other hand, relating to option theory, when there is higher uncertainty in the future value of an investment, which can be undertaken immediately or postponed to a later point in time, the option to defer rises in its value (Damodaran 2012).

[1]Bundesliga (Germany), La Liga (Spain), Ligue 1 (France), Premier League (England), Serie A (Italy)

Considering a transfer as an investment of a certain amount, which can be exercised immediately or delayed to the next transfer window, one would assume the value of the option to wait to be higher in light of the pandemic. Depending on the scale of the uncertainty, one should observe a reduced amount of transfers in 2020.

To elaborate on these considerations, this work project is structured as follows: First, the consequences for football clubs' revenues are outlined to understand the scale of the pandemic's impact. Next, possible implications regarding transfer expenditures according to the two outlined considerations are elaborated in detail. Eventually, these implications are validated based on data on the two most recent summer transfer windows.

2 Evolution of revenues and status-quo

To realize the extent of Covid-19 on football clubs' economic situation, one has to understand their main income streams and how they have been affected first. The three most common revenue sources in football can be broken down into the generation of broadcasting, matchday, and commercial revenue (Amir and Livne 2005). Considering the past decade in European football, the five big leagues could witness their revenues grow by 102.22% to a total amount of €16.97 bn (Gough 2020). The main driver of this extraordinary growth was broadcasting revenue (KPMG 2020a), which accounted for 44% to 59% of the total revenue generated per league in the 2018/19 campaign, followed by commercial revenue (28% to 42%) and matchday revenue (11% to 16%) (Ajadi et al. 2020). The increase of financial budgets through these three sources allowed clubs to spend higher volumes on new signings. Over the mentioned time span, one could observe a correlation of 0.92 (Table 9) between the two figures, leading to transfer expenditures equal to about a quarter of the total revenue generated in the 2018/19 campaign.

As of the measures taken to contain the pandemic, the respective clubs' revenue sources were directly affected. Apart from Ligue 1, the four other leagues could secure the entire

or at least fractions of the expected broadcasting revenues for the remainder of the 2019/20 campaign through the resumption. However, regardless of the resumption, all leagues missed out partly on matchday revenues, since the remaining games took place without spectators. Given these circumstances, Ajadi et al. (2020) predict the most recent campaign's revenue to have decreased by up to 17.09% for the respective leagues. Concerning the 2020/21 campaign, the three revenue sources are facing different challenges. As long as matches can occur, the two main sources, broadcasting and commercial revenue, seem to be secured (Drewes et al. 2020). However, it is likely that a large fraction of the matchday revenues cannot be realized. For example, the British government banned crowds from sports events for at least another six months from September onwards (Morgan and Ramsby 2020). Whether this has to be considered as short-term measures or the *new normal* remains unanswered. Even stricter measures by the government and possible economic effects on commercial and broadcasting partners cannot be ruled out. As a consequence, clubs face increased uncertainty regarding their revenue streams at least for the upcoming campaign and possibly even longer. Knowing about the end of the pandemic or the effectiveness of vaccines would certainly reduce the unpredictability of the near future. For now this remains unanswered.

As of this uncertainty and the close relation between revenues and transfer expenditures, a drop of 42.74% in the volume of transfer expenditures might not be surprising. However, it certainly shows the scale of Covid-19's impact on the previously booming industry.

3 Variables of interest

The enormous drop in the transfer expenditures through a changed spending behaviour by professional football clubs can be considered an adaptation to the pandemic's challenges. Consequently, the pandemic may be understood as the source and the drop in transfer expenditures as the eventual outcome. What remains is the question regarding a potential pattern in the changes of the spending behaviour, which led to the outcome.

With Transfermarkt (2020a) reducing the market value of players at the age of under 23 by 10% and the value of older players by 20% at the beginning of the pandemic, one could expect similar effects on transfer fees. Therefore, a changed spending behaviour based on the time a player has left to play as assumed by KPMG (2020b) could be imaginable.

In the world of finance, the value of the option to postpone an investment increases in times of uncertainty in the future value of the underlying asset (Damodaran 2012). A transfer could be considered as an option to invest immediately or in the next transfer window. Understanding a player's value as a function of his contribution to a club's revenue (Turnau et al. 2005), the value should be of higher uncertainty during the pandemic as of the noticed uncertainty in club's revenues. Therefore, one could expect clubs to prefer delaying investments rather than undertaking them in the recent summer. Assuming clubs to be relatively increasingly risk averse and even more risk averse in times of uncertainty, the transfer fees of expensive players should be absolutely and relatively more sensible to changes in the uncertainty - consequently more volatile. Therefore, the option to delay should have gained more value for players carrying expensive characteristics, if this was the case. Thereby, these characteristics should then have additionally triggered the reduction.

To compare the two considerations and their implications on potential changes in the spending behaviour, it seems reasonable to do this for variables related to both, the time a player has left to play and his transfer fee. Primarily the age of a transferred player, but also his remaining contractual time at the previous club, seem to be ideal for this purpose. Going forward, it is essential to understand how these two variables impact transfer fees.

Eschweiler and Vieth (2004) argue that age is representative of experience and potential. While they observed experience to grow with age, potential rather diminishes. Similar to this argumentation, Sæbø and Hvattum (2015) describe a player's transfer fee related to his age as raising due to increasing experience until his expected performance deteriorates with his age. The same effect was detected by Carmichael and Thomas (1993), who identified transfer fees as a concave function of age, which rises until the prime and decreases progres-

sively afterwards. In line with these findings, one can observe the average transfer fees to be peeking for players between 21 and 26 in recent years (Transfermarkt 2020b).

Long-term contracts ($\geq$ 3 years) appear to be beneficial for both, club and player. The argumentation's main reasons are an increased chance of generating higher revenues through the player over a longer period, just as a reduction in the chance of misplaced investments, since the player is given more time to perform and increase effectiveness. For giving up such privilege, clubs tend to ask for higher compensations in form of transfer fees for players on long-term contracts (Buriamo and Frick 2015).

Accordingly, the age of a player and the remaining contract time can both be found to impact transfer fees and be related to the remaining time a player has to perform. Next, it is to elaborate on how the two previous considerations would find expression in a Covid-affected spending behaviour of football clubs regarding these variables.

3.1 Theory 1

A football club's main objective is arguably sporting success, which comes along with increased revenues (Carmichael and Thomas 1993). As a player's performance is meant to contribute to the sporting success, he can be measured in terms of his ability to impact revenues and thereby cash flows (Scully 2004). Consequently, the longer a player can have a positive impact and the larger this impact is, the more he should be worth in monetary terms (Turnau et al. 2005). Based on these considerations, one could think of a transfer fee as an investment, which requires an upfront payment and aims to increase the buying club's future cash flows eventually. Meaning a transfer adds value to a buying club, if the present value of his impact on those cash flows is perceived to be higher than the transfer fee. Simultaneously, the fee also represents compensation for the positive impact a selling club is missing out on in the future (Simmons 2007). Hence, the transfer is lucrative to a selling club, if the transfer fee exceeds the expected present value a player adds to the club.

Considering the pandemic's current situation, one will notice that a player's ability to contribute to sporting success has hardly been harmed as long as matches take place. However, as of this situation, revenues are expected to decrease (Ajadi et al. 2020). Therefore, a player's contribution to a club's sporting success in absolute revenue terms should be valued lower than before, despite similar performances on the field. Accordingly, one would expect the value, which a player can add to the buying club or the selling club is compensated for, to be lower in light of the pandemic.

Sharing McKinsey's (Charumilind et al. 2020) perception that the impact of Covid-19 will be minimal by the second half of 2021, one would assume revenues to recover soon. Consequently, the effect of a player's contribution to be valued lower would also be temporary. However, depending on the time a player has left to play for his club or in his career, this temporary drop could be of significant importance for his potential transfer fee. While players at a young age experience a small fraction of their remaining career in a time where their contribution is valued less, older players, who only have a few years left to play, experience a large fraction of their remaining career in such times (KPMG 2020b). Considering a transfer fee as compensation for the missed positive impact on future cash flows for the selling club and an investment into a positive impact on the buying club's cash flows, the transfer fee of a young player should have been affected significantly less. Likewise, a player on a long-term contract is more likely to contribute to his current team's sporting success in post-pandemic times than a player on a short-term contract. Accordingly, the compensation for a player, who is likely to deliver value to his current club beyond the pandemic as of his contract length should have also suffered less.

If the market perceives Covid-19 as a phenomenon, which lasts for one or two years, and transfer fees are adjusted based on this consideration, any player should have seen his transfer fee drop. However, younger players should have been observed to experience a smaller decrease in their transfer fees. Furthermore, players who had a long-term contract at their previous club should have also faced less severe losses in their fee. However, to know on

which scale to apply such a discount, clubs would need to be able to roughly estimate the time span of Covid's impact.

3.2 Theory 2

An investor, who is offered the chance to immediately undertake an investment or defer it to a later point, is the owner of a call option (Bodie et al. 2014). Whether he considers the option to wait valuable depends on various factors: the upfront price, the net present value of the expected cash flows of the investment, the volatility of those cash flows and the risk-free rate. By applying the Black-Scholes formula, the investor could then compute the value of his call option. If the value exceeds the net present value of undertaking the investment immediately, a rational investor would always prefer the option to wait, unless the current price is adjusted (Damodaran 2012).

Through the ability to postpone the investment, the investor is given a chance to gather further information on the underlying project, which is especially beneficial in times of uncertainty. Consequently, the value of the option to defer increases with growing uncertainty (volatility) in the expected cash flows of the investment (Berk and De Marzo 2014). One can therefore figure that the option to wait always rises in its value, when the uncertainty in the cash flows is increasing, without having determined any other factor.

Assuming the transfer market to provide players at any price in period 0 and 1, clubs have the call option to buy a player from any price-category within their budget in period 0 or postpone the investment to period 1. Thus, whether to exercise the option or not is based on the expected present value, the investment can add to the club immediately, and the value of the option to wait. As mentioned before, even without knowing further factors, the value of the option to defer would certainly increase, if there was rising uncertainty in the cash flows generated by the investment.

Concerning the pandemic, it was noticed that the football industry's revenues experience increased uncertainty (Ajadi et al. 2020). In chapter 3.1 it was also noticed that a player's

transfer fee could be seen as a function of his impact on revenues, which are generated by the respective club. Hence, transfer fees can also be assumed to undergo higher uncertainty at the moment. Therefore, the option to postpone a transfer should have certainly gained value. Meaning, if the uncertainty is sufficiently high, a general reduction in the number of transfers should then be visible. If perceiving the option to wait as more valuable, a club would only prefer an immediate investment, if the prices would have been lowered. Necessarily, one would expect lower prices for the transfers, which took place. Higher transfer fees considerably bear greater risk in case of failure, especially in times of uncertainty. Therefore, one could assume clubs to be relatively increasing risk averse under uncertainty, meaning they get more risk averse the higher the fee (Kihlstrom and Mirman 1981). If this was the case, the volatility in the fee of expensive players, should generally be more sensitive to uncertainty. Consequently, the option to wait should have gained even more for expensive players as of the pandemic's uncertainty. A player, who had a long-term contract at his previous club or is in the prime age of his career, should be traded comparably less often accordingly.
Summarizing the two presented considerations, the first expects an effect on the average fees concerning the time a player has left to play in his career or for his club. In contrast, the second expects the clubs to postpone their investments unless prices have dropped and this effect to be more extreme for players carrying expensive characteristics. A data-set of transfers from the two previous summer transfer windows was gathered to validate these implications and is evaluated in the next chapters.

4 Methodology

The implications stated in the previous chapter relate to the number of transfers and the fees paid. To elaborate on the effect Covid-19 had on the number of transfers concerning the two variables, three aspects seem to be of importance: First, the overall distribution of players regarding the contractual length and age in the European football industry prior

and post Covid-19, second the distribution among transferred players in the two periods and last the ratio between potential changes in the first two distributions. By this approach, it is secured that potential effects originate from a change in the clubs' buying behaviour and not an overall shift in the industry. In contrast to the analysis of the number of players, a transfer fee can only be observed for players, who were actually transferred. Consequently, the analysis of the fees against the background of the two variables focuses solely on examining the activities on the transfer market.

4.1 Dataset

To perform the suggested analyses, two samples were created. Both consist of data from the summer transfer windows in 2019[2] and 2020[3] - the former representing the prior-Covid and the latter the post-Covid situation. Both samples focus on the big five leagues. As these cover about 75% of the market value of all European top-flights, they are assumed to be representative of the entire European market. *Transfermarkt.com* (Transfermarkt 2020b) served as the source for the samples.

To analyse all activities on the transfer market, Sample 1 was created. The sample consists of the transfer fee, age, and remaining contract length of all players transferred into or out of one of the five leagues in the two observation periods. Free-agents or loan deals were excluded, as free agents, regardless of Covid-19, do not require a transfer fee and loan-fees can hardly be compared to fees paid for permanent deals.

To hold the transfer-market activities against the background of trends in the overall industry, Sample 2 was created. To satisfy the needs, one would have to collect player information just before the opening of the transfer windows. However, these information are not available. Therefore, Sample 2 consists of all players listed for a squad and equipped with a professional contract by the beginning of the 2019/20 and 2020/21 campaign. For each player, the age and contract length were taken note of. To approximate the situation before the transfer period,

[2]01.07.2019 - 02.09.2019
[3]01.07.2020 - 05.10.2020

the remaining contract length at his previous club was included for each transferred player. Additionally, it was assumed that players, who were not transferred during the summer, did not extend their contract, meaning the contractual end date at the beginning of the season to equal the one at the end of the previous season. Not included were players, who featured the squad on a loan-basis or moved to the club as a free agent, since their contract length would bias the sample. As of the set-up of this sample, it only considers transfers within or coming into one of the big five leagues.

Based on these two samples, the implications of the two theories can be validated. To do so, the analysis is broken down into two parts: one regarding the age and the other regarding the remaining contractual time. For each, Covid's impact concerning the number of transfers and the transfer fee is in the point of focus. A detailed description of the variables and significant levels used for the analyses can be found in the appendix (Table 12 & Table 13). Next, the statistical approaches for the analyses are introduced.

4.2 Age

The number of players per age (in absolute years) would be considerably low, especially for Sample 1. Consequently, a robust analysis of the number of transfers or the fee related to the age in absolute years appears difficult. However, building compromising groups would certainly increase the robustness of the analysis. While building these groups, not contradicting the observation of Carmichael and Thomas (1993) that a player's transfer fee can be modelled as a concave function of his age, seems to be important. Therefore, the age-groups' borders are determined in a fashion that the groups represent different stages in a player's career. Group 1 (under 21) represents the transition between youth and professional football, Group 2 (21 - 26) the supposed prime of a player in which his performances and transfer fees peak, Group 3 (27 - 32) the post-prime in which the performances start to deteriorate with the age and Group 4 (over 32) the ultimate stage before a player retires.

4.2.1 Number of transfers

As mentioned before, for the number of transfers, a three-staged analysis is applied. Theory 2 assumes the number of transfers of expensive players to have decreased the most. According to Carmichael and Thomas (1993), these players should be found in Group 2, as their performances are assumed to be peaking and do not deteriorate with their age yet. To assess the overall situation regarding these players in the football industry, the following aspects are of interest: 1) if the number of players per age belonging to Group 2 is different in general, 2) if the overall number of listed players per age has changed post-Covid and 3) if a potential change is different for players at age, which falls in the range of Group 2. To analyse these aspects, Regression 1 is run over Sample 2:

$$Players = \beta_0 + \beta_1 \cdot Prime + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Prime \cdot Summer_{2020} \quad (1)$$

Regarding the transferred players, the same aspects are considered to be of interest as for the overall situation. Therefore, Regression 2 is run following Regression 1 on all ages of transferred players:

$$Transfers = \beta_0 + \beta_1 \cdot Prime + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Prime \cdot Summer_{2020} \quad (2)$$

It must be excluded, that potential effects among the transfers originate from general changes in the industry. Therefore, a significantly different ratio of transfers per age among all listed players would indicate a spending behaviour differentiating from industry trends. Therefore, Regression 3 is designed to show, 1) if the fraction of transferred players per age is generally different for ages in the range of Group 2, 2) if the general quotient of transfers per age has changed post-Covid and 3) if there was an additional impact on players in their prime:

$$Transfer = \beta_0 + \beta_1 \cdot Prime + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Prime \cdot Summer_{2020} \quad (3)$$

4.2.2 Transfer fee

Theory 1 expects the average fee to have decreased more for older players. Theory 2 assumes especially expensive players to have decreased in their fees. To elaborate on both implications,

a two-sample hypotheses test is performed on the difference of the means of each of the four age-group's transfer fees. The hypotheses are the same for all groups:

$$H_0 : \mu_{2020} = \mu_{2019} \qquad H_1 : \mu_{2020} \neq \mu_{2019} \qquad (4)$$

Rejecting H_0 and a negative change in the mean, would be expected for the older groups according to Theory 1. In contrast, an indication for Theory 2 would be rejecting H_0 and a negative change in the mean of Group 2.

4.3 Contracts

Analysing the number of transfers per contractual length in the two periods, a limited number of observation points are available. Consequently, the identification of significant changes is harmed. To identify if the number of listed players or transfers was reduced, as assumed by Theory 2, several regressions are performed. Besides, hypotheses tests on the difference of the mean contractual time span in the observation periods are performed to further examine the scale of the absolute changes after the outbreak of Covid-19.

4.3.1 Number of transfers

As outlined before, to test potential effects on the number of transfers, three steps are performed. First, a potential shift in the number of players in the overall market is analysed. Therefore, it is of interest to reveal, 1) if the number of listed players on the rosters of European football clubs, differentiates with increasing contract length, 2) if Covid-19 had a significant impact on the overall number of these listed players and 3) if a potential effect was different depending on the contractual length. To cover these aspects Regression 4 is suggested:

$$Players = \beta_0 + \beta_1 \cdot Contract + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Contract \cdot Summer_{2020} \qquad (5)$$

To get an additional impression on the scale of the potential absolute changes, the difference between the means of the contractual times of the two observation periods is inspected by

applying a two-sample hypothesis test. Through the test it can certainly be examined, if clubs preferred longer or shorter contractual length after the outbreak. To do so the hypotheses are stated as follows:

$$H_0 : \mu_{2020} \geq \mu_{2019} \quad H_1 : \mu_{2020} < \mu_{2019} \quad (6)$$

The rejection of H_0 would not prove, but certainly indicate a relative shift towards shorter contractual time spans among the listed players. Theory 2's expected stronger decrease of long-term contract transfers could then potentially originate from a shift in the contractual time among all listed players.

Regarding the transferred players, the same aspects are considered to be of interest as for the overall situation. Therefore, Regression 5 is run following Regression 4 on all transferred players:

$$Transfers = \beta_0 + \beta_1 \cdot Contract + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Contract \cdot Summer_{2020} \quad (7)$$

Again, a two-sample difference test is performed on all transferred players to get a sense of the extent of potential absolute changes:

$$H_0 : \mu_{2020} \geq \mu_{2019} \quad H_1 : \mu_{2020} < \mu_{2019} \quad (8)$$

To exclude that potential effects in Sample 1 originate from general changes in the industry, the ratio of transfers to all listed players is of interest. As Theory 2 expects different effects on short-term and long-term contract players, Sample 2 is divided into long-term and short-term contract players. If the conditional ratio of transfers, would not have changed significantly for one category of players, clubs could be assumed to rather have adopted their transfer politics to shifts in the overall market. Therefore, Regression 6 is designed to show, 1) if the fraction of transferred players is different for players on long-term contracts in general, 2) if the general percentage of transferred players has changed and 3) if there was an additional impact on transfers of players on long-term contracts:

$$Transfer = \beta_0 + \beta_1 \cdot Long + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Long \cdot Summer_{2020} \quad (9)$$

4.3.2 Transfer fee

As of the two theories' implications, it is of interest 1) if transfer fees differentiate depending on the length of a contract, 2) if the respective transfer fees were adjusted and 3) if the adjustment differentiates based on the contract type. To adjust for outliers, the natural logarithm of the market value of a player was used as a dependent variable by Wicker et al. (2013). This idea is applied on the transfer fees in Regression 7:

$$log(Fee) = \beta_0 + \beta_1 \cdot Long + \beta_2 \cdot Summer_{2020} + \beta_3 \cdot Long \cdot Summer_{2020} \quad (10)$$

5 Results

Considering Sample 1, a drop of 42.74% from €5.48 bn to €3.35 bn in the total transfer expenditures can be observed. In contrast to the development in the previous years, the drop was primarily triggered by a decrease in the number of transfers from 756 to 489 (-35.32%) and intensified by a decrease of €0.89 mil (-11.47%) in the average fee paid. Additionally, one could observe the absence of transfers beyond the prestigious €100 mil mark, since Kai Havertz's €81 mil move from Leverkusen to Chelsea set the highest transfer fee of summer (Transfermarkt 2020b). This amount is only about two-thirds of the reported €126 mil Atletico Madrid paid for João Félix in the previous summer. A decrease in the standard deviation of the fees by 18.07%, therefore stipulates a market with less extreme outliers. Both observations arguably indicate a market where the participants reduce the number of investments and avoid large expenditures. However, without analysing the statistical analyses' outcomes, a conclusion regarding the stated hypotheses may not be drawn.

5.1 Age

When comparing the total volume of transfer expenditures spent on the four respective age-groups in 2019 and 2020, one can witness the combined volume of the first two groups to have decreased by 44.96%, while the combined volume of the latter two groups only dropped

by 1.65%. Therefore, a specific reduction in the volume spent concerning the players' age seems to be likely. To further examine these observations, the number of transfers and the fees per group in the respective periods are analysed in detail.

5.1.1 Number of transfers

Regression 1 indicates that significantly more players are between 21 and 26 years old, given the overall distribution of players. After the outbreak of Covid-19, an overall decreasing amount of players and an additional decrease concerning any age falling into the range of Group 2 is present. Despite these effects not being significant, they partly describe why the average age increased from 25.4 to 26.0 years.

Table 1: Regression 1

$Players = Prime + Summer_{2020} + Prime \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	88.688	13.369	5.634	6.09e-08	***
Prime	103.313	25.600	4.036	0.000239	***
$Summer_{2020}$	-1.312	18.907	-0.069	0.945002	
$Prime \cdot Summer_{2020}$	-13.688	36.204	-0.378	0.707378	

A similar, however significant effect, can be found when analysing the transfers through Regression 2. As for all listed players, significantly more players between the age of 21 and 26 are transferred. Regarding the post-Covid observation period, for each age, roughly 6 transfers less were reported on average. More interestingly, each age lying in the range of Group 2, experienced an additional significant decrease of about 24 transfers on average. Meaning clubs limited their transfer activities in absolute terms especially for players, whose performances are supposed to be peaking. As these tend to be more expensive (Sæbø and Hvattum 2015), this behaviour could be interpreted as avoiding large investments.

To find out if this effect mainly originates from a higher number of players in the range of Group 2, Regression 3 was run. According to the results, the fraction of transfers among

Table 2: Regression 2

$Transfers = Prime + Summer_{2020} + Prime \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	21.000	3.413	6.153	4.35e-07	***
Prime	56.000	6.231	8.987	9.95e-11	***
Summer_{2020}	-6.143	4.827	-1.273	0.21130	
$\text{Prime} \cdot \text{Summer}_{2020}$	-24.357	8.813	-2.764	0.00895	**

all players is significantly higher for ages between 21 and 26. The percentage of transfers decreased significantly by 3.7 p.p. on average in the post-Covid period for all ages. However, for ages in the range of Group 2, this number dropped significantly by additional 3.4 p.p. on average. Consequently, when randomly picking a player from a specific age, the conditional likelihood that this player is a transfer decreased significantly more in absolute terms if that age falls into the range of Group 2. Using the regression to approximate the conditional fractions of transfers depending on the year and belonging to Group 2 or not, one will find that the respective fraction for ages in Group 2 is 1.80 times higher than for the remainders in 2019, however only 1.73 times higher in 2020. Consequently, the chance of picking a random player from one of the ages in Group 2 and him being transferred also decreased more in relative terms, despite the larger absolute scale.

Table 3: Regression 3

$Transfer = Prime + Summer_{2020} + Prime \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	0.129730	0.009992	12.893	$<$ 2e-16	***
Prime	0.104197	0.014142	7.368	92.01e-13	***
Summer_{2020}	-0.03711	0.0141170	-2.379	0.0174	*
$\text{Prime} \cdot \text{Summer}_{2020}$	-0.034391	0.020243	-1.699	0.0894	.

Considering these results one can find a significantly higher absolute and a relative reduction in transfers of players in their prime. Consequently, Theory 2's assumption of a reduction concerning expensive characteristics in the buying behaviour of clubs after the pandemic's outbreak seems to be favoured by these results. A risk aversion, which increases relatively more for large investments, might therefore be a possible explanation.

5.1.2 Transfer fee

As mentioned before, Sæbø and Hvattum (2015) describe a transfer fee to rise until the age of a player deteriorates with his performance and to decrease from that point onwards. Considering Sample 1, such evolution in the transfer fees can be noted. In both periods, the average transfer fee rises from Group 1 to Group 2 and shows a continuous decrease for Group 3 and 4. The assumption that players from Group 2 can be considered to be in the peak of their performance, therefore, seems to be reasonable according to Carmichael and Thomas (1993).

Due to a significant reduction in transfers of players from Group 2, the average fee should be impacted by this shift, as these players are found to be most expensive in literature and Sample 1. Furthermore, the average fee is observed to decrease for the first two groups and increase for the latter two. However, the performed hypotheses tests indicate, that only the mean of Group 4 can be rejected to be equal in 2019 and 2020. Consequently, one can just observe insignificant trends for changes in the transfer fees of the remaining groups.

The observations certainly contradict the implication of Theory 1, that older age-groups should have suffered more in their fees as of the pandemic. Regarding Theory 2, the trend of decreasing transfer fees for players in their prime definitely favours the stated implication. However, the significant increase for Group 4 seems to be contradicting the theory at first sight. However, Theory 2 mainly sees the reason to defer transfers in the increased value of the option to wait. Though for a player, who is likely to retire soon, waiting does not seem attractive or valuable. Based on this consideration the continued trend of increasing fees for

older players does not contradict Theory 2. Therefore, one can interpret the observations as a further indication for football clubs avoiding players, who carry expensive characteristics, as they perceive the option to wait for such players as more valuable. To conclude on how transfer expenditures changed post-Covid regarding a player's age, a significant reduction in the number of transfers in Group 2 and a trend of decreasing average fees in Group 1 & 2 does certainly explain a reduction of over 40% in the transfer expenditures of the two younger groups. In contrast, an increased transfer fee and a limited reduction in the number of transfers led to a marginal decrease in the two older age groups' expenditures.

5.2 Contract

Clustering Sample 1 into players on short-term (1 - 2 years) and long-term (3 years +) contracts, one can observe a decrease in the volume spent of 24.10% for players on short-term contracts and a drop of 60.70% for players on long-term contracts. A different treatment concerning the length of contracts and consequently a contract specific discount seems to be present. Furthermore, one could observe a decrease in the average contractual length from 3.05 to 2.64 among all listed and 1.84 to 1.69 among transferred players. To further elaborate on these observations, the before suggested statistical methods are performed.

5.2.1 Number of transfers

Regression 4 indicates a significantly higher decrease in the number of players, in absolute terms, the longer the respective contractual time span. More interestingly, an overall increase in the number of players by roughly 80 on average is observed for the summer of 2020. However, this increase is offset by a decrease of about 23 on average in the number of transfers per additional year on the contract. Meaning an increase in the number of players on shorter time spans and an eventual decrease for their peers the longer the contract. The described effects may not be significant. However, the mentioned small number of observation points could be considered a possible explanation for the insignificance.

Table 4: Regression 4

$Players = Contract + Summer_{2020} + Contract \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	822.57	117.97	6.973	3.84e-05	***
Contract	-116.29	26.38	-4.408	0.00132	**
Summer_{2020}	80.86	166.83	0.485	0.63836	
$\text{Contract} \cdot \text{Summer}_{2020}$	-23.11	37.31	-0.619	0.54950	

To further elaborate on the insights gained through Regression 4, the hypothesis test was performed. As a result, H_0 was rejected, meaning the mean of the contractual length in 2020 is significantly unequal to and not higher than the mean in 2019. This might not be proof for H_1. However, it certainly is an indication for a shorter mean contractual time in 2020. Considering that Regression 4 indicated an increase of short-term and decrease of long-term contracts among all listed players, the hypothesis test's significant result certainly supports this perception. To conclude, an overall preference in the industry towards shorter contracts, which led to a decrease in the average contractual time span, is likely. As of the financial uncertainty created by the pandemic, not extending contracts and if just by a short time span, could be a potential explanation.

Regression 5 shows that the number of transfers, in general, is indicated to decrease significantly in absolute terms for each additional year on a contract. As fewer clubs are likely to afford the higher fees for players on long-term contracts (Buriamo and Frick 2015), this result seems to be reasonable. An overall significant decrease in the number of transfers per contractual time span, as expected by Theory 2, is stipulated by the negative estimate for β_2. The positive estimate for β_3 signals, that the overall decrease is offset the longer the respective contractual time span lasts. However, this effect is not significant. Therefore, it can not be rejected that transfers of players on longer contracts decreased significantly less in absolute terms. Additionally, as of the negative estimate for β_1, one can figure that fewer players on long-term contracts are transferred in general. Meaning, despite a potential lower

Table 5: Regression 5

$Transfers = Contract + Summer_{2020} + Contract \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	406.300	31.631	12.845	1.37e-05	***
Contract	-85.900	9.537	-9.007	0.000105	***
Summer_{2020}	-122.600	44.733	-2.741	0.033704	*
$\text{Contract} \cdot \text{Summer}_{2020}$	23.200	13.488	1.720	0.136204	

decrease in absolute terms, the impact might be more severe in relative terms and regarding the reduced transfer expenditures.

Comparing the difference between the means of all transferred players' contractual time span in the two respective periods, H_0 is rejected. Meaning the mean contractual time in 2020 is significantly unequal to and not higher than the one in 2019. Again, one should not conclude this to be proof of H_1. However, a higher preference in relative terms for buying players on shorter contract spans seems likely. The significant result also goes hand in hand with the observed decrease in the average contractual time span from 1.84 to 1.69 years among transferred players. The result certainly supports the view of a relatively spoken stronger decrease for long-term contracts. Thus, the assumption of a trend for a stronger avoidance of expensive characteristics, as assumed by Theory 2, cannot be rejected in absolute terms and seems to be present in relative terms concerning all transferred players.

The question, which arises from these observations, is how the observations on the transfer-market can be interpreted bearing in mind the overall industry. To do so, Regression 6 was suggested. The regression's estimates indicate how the conditional ratio of transfers changed for the respective characteristics. Not surprisingly, the conditional fraction of transfers decreased significantly for long-term contracts in general. Furthermore, the regression indicates a significant drop of 9 p.p. on average in the relative stake of transfers comparing 2019 to 2020. As roughly the same number of players are listed in both periods (2469 and 2586), the results show a significant drop in the total number of transfers, which matches the observed

effect in the results of Regression 5. Regarding the long-term contract players, the regression shows a significantly lower drop from 2019 to 2020, as the overall drop of 9 p.p. on average is offset by an average increase of 4.6 pp for players on long-term contracts. Consequently, in absolute percentage points terms, short-term players suffered more. As of the set-up of the samples and the applied regression, only absolute percentage points are considered. However, as the conditional fraction was significantly higher for a short-term contract player in 2019, comparing the impact of Covid-19 only on an absolute scale appears to be less meaningful. The decrease indicated by the regression for long-term contracts from 2019 to 2020 represents a relative drop of 40.43%, while the conditional ratio of transfers of short-term contract players only decreased by 33.12%. As a consequence, the conditional likelihood of picking a transferred player from all listed short-term contract players was 2.78 times higher than for someone on a long-term contract. In 2019 it was only 2.48 times as high.

Table 6: Regression 6

$Transfer = Long + Summer_{2020} + Long \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	0.27466	0.01047	26.227	<2e - 16	***
Long	-0.16380	0.01439	-11.386	<2e - 16	***
$Summer_{2020}$	-0.09097	0.01430	-0.02058	2.17e-10	***
$Long \cdot Summer_{2020}$	0.04615	0.02058	2.243	0.025	*

To conclude, a shift towards shorter contracts in the industry is likely. Additionally, a significantly decreased number of transfers was observed. Relatively spoken, this reduction seemed to be higher for players on longer contracts, as the mean contract length was observed to be significantly unequal to and not higher than in 2019. The conditional probability of a transfer for long-term contract players decreased more than for their peers. Consequently, one can assume the findings not to be rejecting Theory 2's assumption of a decreased number of transfers. Furthermore, the assumption of a higher decrease for players on long-term contracts appears to be present in relative terms.

5.2.2 Transfer fee

Considering that relatively spoken, more short-term contract players were transferred in 2020, this shift itself should have an impact on the average fee, as these players tend to be cheaper on average (Buriamo and Frick 2015). Additionally, Regression 7 indicates, that a long-term contract increases a transfer fee significantly in general by 116.3 % on average. The average transfer fee however, is indicated to have increased significantly overall by 29.39% from 2019 to 2020. This is offset by a significant decrease of 41.62% for players on a long-term contract. Players on short-term contracts may therefore still be cheaper in the market, but the results of the regression undermine the observed effect of an increased price for players on short-term contracts and a lower price for players on long-term contracts.

Table 7: Regression 7

$log(Fee) = Long + Summer_{2020} + Long \cdot Summer_{2020}$					
Coefficient	Estimate	Std. Error	t-Value	p-Value	Indication
Intercept	0.9856	0.0687	14.346	<2e - 16	***
Long	1.1630	0.1296	8.975	<2e - 16	***
Summer_{2020}	0.2939	0.1082	2.715	0.00674	***
$\text{Long} \cdot \text{Summer}_{2020}$	-0.4162	0.2230	-1.866	0.06235	.

Considering theses results, one can conclude that especially for the expensive long-term contract players, clubs tended to pay lower fees. In contrast, the previous inflation of transfer fees apparently continued for their peers on short-term contracts.

In the beginning of this subsection a drop of 4.10% for players on short-term contracts, and 60.70% for players on long-term was noted. These drops were mainly triggered by an overall reduction in the number of transfers. The higher decrease for long-term contracts was mainly enhanced by a relatively spoken higher reduction in the number of transfers and a significant decrease in the average fee. In contrast, the drop of short-term players was minimal as of an increased average transfer fee. These results certainly contradict with the

implication of Theory 1. While the significant decrease of long-term contract players' fees is definitely what was expected by Theory 2, the increase for short-term contracts however, might be contradicting at first sight. However, a strong negative correlation (0.89) between the remaining contractual time and the age of a player can be found in Sample 1. Therefore, the increase of transfer fees for players on short-term contracts is likely to be partially due to the less valuable option to wait concerning older players.

Table 8: Results

	Number of transfers	**Transfer fee**
Contract	- significant decrease of overall transfer activities - stronger decrease for players on long-term contracts in relative terms	- significant increase for players on short-term contracts - significant decrease for players on long-term contracts
Age	- trend of decrease for players of any age - significant decrease for players between 21 and 26	- trend of an decrease for players under 27 - significant increase for players over 31

In light of the results, the two theories face different outcomes. Theory 1's implications of lower reductions in young players' fees and players on long-term contracts can certainly be rejected as of the results. According to Theory 2, a reduction in the number of transfers was expected, focusing on players carrying expensive characteristics. Furthermore, a reduction in the transfer fees for those players was expected. Considering the results, especially the reduction in the number of transfers was observed. Concerning expensive characteristics, a specific reduction regarding players in their prime ages and a relative reduction for players on long-term contracts were present in the market. Consequently, it seems likely, that as of the increased uncertainty in the future value of investments in form of transfers, many clubs perceived the option to defer their investments as more valuable than investing immediately. As this effect was found to be more extreme for long-term contract players, the assumption that their values are more volatile is likely. A relatively higher increase in the risk aversion for large investments under uncertainty by the clubs could therefore be likely. One may argue, that clubs did not choose to delay investments, as they were rather constraint as of losses in ticket revenues or sponsorships. If this was the case, one should see leagues, which face

higher losses to have been constraint the most. Ajadi et al. (2020) estimate the Premier League to face the largest losses as of the pandemic. However, it did not show the highest reduction in transfer activities. Therefore, one should not reject Theory 2.

6 Conclusion

The purpose of this work project was to analyse the impact of Covid-19 on transfer expenditures in European football. First, football clubs' future revenues were observed to be uncertain as of the unknown return of fans to the stadium and potential further effects on broadcasting and commercial partners. Furthermore, it was noticed that transfer expenditures dropped by a total of 42.74 %. Considering this drop, two theories to explain the outcome were introduced. One considers a drop in transfer fee depending on the time a player has left to play. The other is drawing a comparison to the option theory assuming, clubs defer the option to invest in transfers due to growing uncertainty in their underlying value. In a next step, the age of a player and the remaining contractual time were identified as ideal variables to analyse both theories. Through the application of statistical methods, it was observed, that the first theory can be rejected. If clubs knew the length of the pandemic's impact, it would be more likely to see time-based discounts. As this did not happen, one can assume, that clubs simply cannot proxy the expected time span. However, the results were either in line with the second theory or not rejecting it. Consequently, as of the growing uncertainty concerning the underlying value, clubs appear to have preferred to defer investments. This behaviour was especially found to be significant for expensive player characteristics. Therefore, a larger increase in the volatility of their values seems possible. A potential explanation was found to be a relatively higher risk aversion for large investments under uncertainty. Therefore, the answer to the research question is that clubs cut transfer expenditures primarily through a reduced number of investments, especially in players carrying expensive characteristics and secondly by adjusting these players' transfer fees.

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Appendixes

A Appendix

A.1 Tables

Season	Transfer expenditures	Revenue
2009/2010	1.99	8.39
2010/2011	1.30	8.57
2011/2012	1.79	9.30
2012/2013	1.62	9.81
2013/2014	2.30	11.30
2014/2015	2.34	12.06
2015/2016	3.08	13.42
2016/2017	3.38	14.66
2017/2018	4.44	15.61
2018/2019	3.58	16.97

Table 9: Evolution of Transfer expenditures (Transfermarkt 2020b) and revenues (Gough 2020) in the big five leagues in € bn

Figure	Summer 2019	Summer 2020	Change
Number of Transfers	756	489	-35.32%
Average Fee (in Mio. €)	7.74	6.85	-11.47%
Volume (in Mio. €)	5848.03	3348.76	-42.74%
Standard Deviation	13.83	11.33	-18.09%
Median (in Mio. €)	2.70	2.50	-7.41%

Table 10: Comparison summer transfer windows 2018/19 & 2019/20

League	**Revenue 18/19**	**Predicted loss**	**Prediction revenue 19/20**
Premier League	5851	1000 (- 17,09%)	4851
Ligue 1	1903	100 (- 5.25%)	1803
Bundesliga	3344	0 (0.00%)	3344
Serie A	2495	400 (- 16.03%)	2095
La Liga	3375	300 (- 8.89%)	3075

Table 11: Revenue prediction 2019/2020 campaign in € mil (Ajadi et al. 2020)

A.2 Regression variables and significance levels

Variable	Description
Contract	Time left on a player's contract in the respective period
Fee	Transfer fee paid by the buying club to the selling club
Long	0 = time left on the player's contract is equal to 2 or less years 1 = time left on the player's contract is longer than 2 years
Players	Number of players matching the respective characteristics
Prime	0 = player is younger than 21 or older than 26; 1 = player is between 21 and 26 years old
Summer_{2020}	0 = observation period is not Summer 2020 1 = observation period is Summer 2020
Transfer	0 = respective player was not transferred in the respective period; 1 = respective player was transferred in the respective period
Transfers	Number of transfers matching the respective characteristics

Table 12: Regression Variables

Indication	Significnace Level
	≥ 0.1
*	< 0.1
**	< 0.05
***	< 0.01

Table 13: Significance Levels

A.3 Hypotheses tests

A.3.1 Age

For each age-group the same two-sample mean difference test is performed:

$$H_0 : \mu_{2020} = \mu_{2019} \quad H_1 : \mu_{2020} \neq \mu_{2019}$$

$$T = \frac{\tilde{Y_1} - \tilde{Y_2}}{\sqrt{\frac{s_1^2}{N}_1 + \frac{s_2^2}{N}_2}}$$

$$H_0 \text{ is rejected if } |T| > t_{1-0,5\alpha,v}$$

$$v = \frac{(s_1^2/N_1 + s_2^2/N_2)^2}{(s_1^2/N_1)^2(N_1 - 1) + (s_2^2/N_2)^2(N_2 - 1)}$$

Group 1

$$\tilde{Y_1} = 7.77 \quad \tilde{Y_2} = 6.91 \quad N_1 = 105 \quad N_2 = 57 \quad s_1 = 16.06 \quad s_2 = 9.18$$

$$|T| = 0.43 \quad t_{1-0.5\cdot 0.05,48} = 2.01$$

$$H_0 \text{ is not rejected.}$$

Group 2

$$\tilde{Y_1} = 8.49 \quad \tilde{Y_2} = 7.94 \quad N_1 = 462 \quad N_2 = 279 \quad s_1 = 13.16 \quad s_2 = 12.17$$

$$|T| = 0.58 \quad t_{1-0.5\cdot 0.05,498} = 1.97$$

$$H_0 \text{ is not rejected.}$$

Group 3

$$\tilde{Y}_1 = 6.43 \quad \tilde{Y}_2 = 7.52 \quad N_1 = 169 \quad N_2 = 136 \quad s_1 = 14.69 \quad s_2 = 10.86$$

$$|T| = 0.75 \quad t_{1-0.5\cdot 0.05,133} = 1.98$$

H_0 is not rejected.

Group 4

$$\tilde{Y}_1 = 1.17 \quad \tilde{Y}_2 = 4.05 \quad N_1 = 20 \quad N_2 = 17 \quad s_1 = 2.35 \quad s_2 = 1.29$$

$$|T| = 4.70 \quad t_{1-0.5\cdot 0.05,62} = 2.00$$

H_0 is rejected.

A.3.2 Contracts

The same hypotheses test is performed on all listed and all transferred players.

$$H_0 : \mu_{2020} \geq \mu_{2019} \quad H_1 : \mu_{2020} < \mu_{2019}$$

$$T = \frac{\tilde{Y_1} - \tilde{Y_2}}{\sqrt{\frac{s_1^2}{N}1 + \frac{s_2^2}{N}2}}$$

$$H_0 \text{ is rejected if } T < -t_{1-0.5\alpha,v}$$

$$v = \frac{(s_1^2/N_1 + s_2^2/N_2)^2}{(s_1^2/N_1)^2(N_1 - 1) + (s_2^2/N_2)^2(N_2 - 1)}$$

Transfers

$$\tilde{Y_1} = 1.69 \quad \tilde{Y_2} = 1.83 \quad N_1 = 489 \quad N_2 = 756 \quad s_1 = 0.83 \quad s_2 = 1.29$$

$$T = -2.33 \quad -t_{1-0.5\cdot 0.05,500} = -1.646$$

$$H_0 \text{ is rejected.}$$

Listed players

$$\tilde{Y_1} = 2.64 \quad \tilde{Y_2} = 3.05 \quad N_1 = 2469 \quad N_2 = 2586 \quad s_1 = 1.23 \quad s_2 = 1.31$$

$$T = -7.94 \quad -t_{1-0.5\cdot 0.05,500} = -1.646$$

$$H_0 \text{ is rejected.}$$

Declaration of Authorship

I hereby declare that, to the best of my knowledge and belief, this Work Project titled "The Impact of Covid-19 on Transfer Expenditures in European Football" is my own work. I confirm that each significant contribution to and quotation in this thesis that originates from the work or works of others is indicated by proper use of citation and references.

Lisbon, 04.01.2021

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